

USE OF GONOCOXAЕ AND THE STERNAL APEX TO IDENTIFY
ADULT FEMALES OF NORTH AMERICAN *GYRINUS*
GEOFFROY (COLEOPTERA: GYRINIDAE)¹

William L. Hilsenhoff
Department of Entomology
University of Wisconsin
Madison, WI 53706
U. S. A.

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ABSTRACT

A taxonomic study of species of Gyrinidae occurring in Wisconsin revealed that the large, sclerotized gonocoxae of adult females of Gyrinus differ substantially among species. By using their shape and the shape of the apex of the last visible abdominal sternum, along with the microsculpture on the elytra and characters also found on males, positive identification of females of Gyrinus can be achieved.

INTRODUCTION

Taxonomic studies of North American Gyrinidae have relied heavily on structures of the male genitalia for identification of specimens of the various species. As a result, adult females are often difficult or impossible to identify with published keys and descriptions. In his revision of *Gyrinus* H. C. Fall (1922: 272-273) noticed the female genitalia with their large, paddle-shaped gonocoxae, but remarked that "they seem to be substantially alike in all species". He stated that while specimens of most species could be identified by characters in his key, one should always check the male genitalia and that "in fact there are a few species which I am disposed to believe can never certainly be recognized in any other way". He further concluded that "Females are often very difficult to place except through association with males". Since individuals of several species often occur in the same aggregation, identification of females by association with males is risky.

More recently, Ferkinhoff and Gundersen (1983: 7) also concluded that the male genitalia were the only dependable character for identifying adults of some species and that "Females in such cases can only be tentatively identified by matching them with males taken from the same location on the same date.". Like Fall, they too stated that "The genitalia of female *Gyrinus* are very similar in all species and are of little-or-no diagnostic value.". In her 1988 revision of *Gyrinus*, Oygur also relied primarily on male genitalia for separating specimens; her key to female adults (1988: 60-71) did not use the genitalia and did not offer means to identify females of 12 species. However, F. E. Wood (1968: 3) did use

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gonocoxae of females in synonymizing *Dineutus analis* Régimbart with *D. serrulatus* LeConte, and in Europe, Franciscolo (1979: 171-175) and Holmen (1987: 36-45) used gonocoxae to aid in identification of females. The gonocoxae, which are derived from the ninth sternum and are part of the genital segments (Burmeister 1976: 229-231), were called "coxites" by Tanner (1927: 21) and "hemisternites" by Lindroth (1957: 250-251).

MATERIAL AND METHODS

To develop reliable species keys for both male and female adults of Gyrinidae, I studied more than 25,000 specimens from Wisconsin. Seventy-eight percent of them were distributed among 20 species of *Gyrinus*; the remainder included 4 species of *Dineutus*. I studied the gonocoxae, the shape of the last visible abdominal sternum, and the elytral microsculpture of females of all Wisconsin species. I also studied adults of a few additional species known to occur in the western Great Lakes region, but was unable to borrow specimens of many other North American species because they were being used in a revisionary study.

RESULTS AND DISCUSSION

The results of this study illustrate the value of gonocoxae, and to a lesser extent the sternal apex, for identifying females of *Gyrinus*. In females of *Dineutus* the gonocoxae (Fig. 1), which differ substantially from those of females of *Gyrinus* (Figs. 2-14) by being widened near the mid-length, are not substantially different in the four species that were studied (*D. assimilis* Aubé, *D. discolor* Aubé, *D. hornii* Roberts, *D. nigriflor* Roberts), and no difference was noticed in the broadly rounded sternal apex (Fig. 15). The gonocoxae of females of *Gyrinus*, however, vary greatly, ranging from elongate in the very large specimens of *Gyrinus impressicollis* Kirby (Fig. 2) to short and round in specimens of *Gyrinus* sp. nr. *minutus* (Fig. 3), a species that is very similar to *G. minutus* Fabricius and is being described by F. M. Atton, Saskatoon, Sask. Also, the shape of the apex of the last visible abdominal sternum differs between females of several species of *Gyrinus* in which specimens are otherwise similar.

In *Gyrinus*, the gonocoxae of specimens often differ so greatly that they are a valuable aid in sorting females in collections of individuals of similar size, color, and elytral structure. For example, females of *Gyrinus marginellus* Fall have narrow, divergent gonocoxae (Fig. 4) that readily distinguish them from females of *Gyrinus aeneolus* LeConte, which have broader, more rounded, parallel gonocoxae (Fig. 5). Similarly, females of *Gyrinus analis* Say have elongate, parallel-sided, and apically truncate gonocoxae (Fig. 6) that differ markedly from the divergent gonocoxae of females of *Gyrinus frosti* Fall (Fig. 7), *Gyrinus sayi* Aubé (Fig. 8), and other species with black venters.

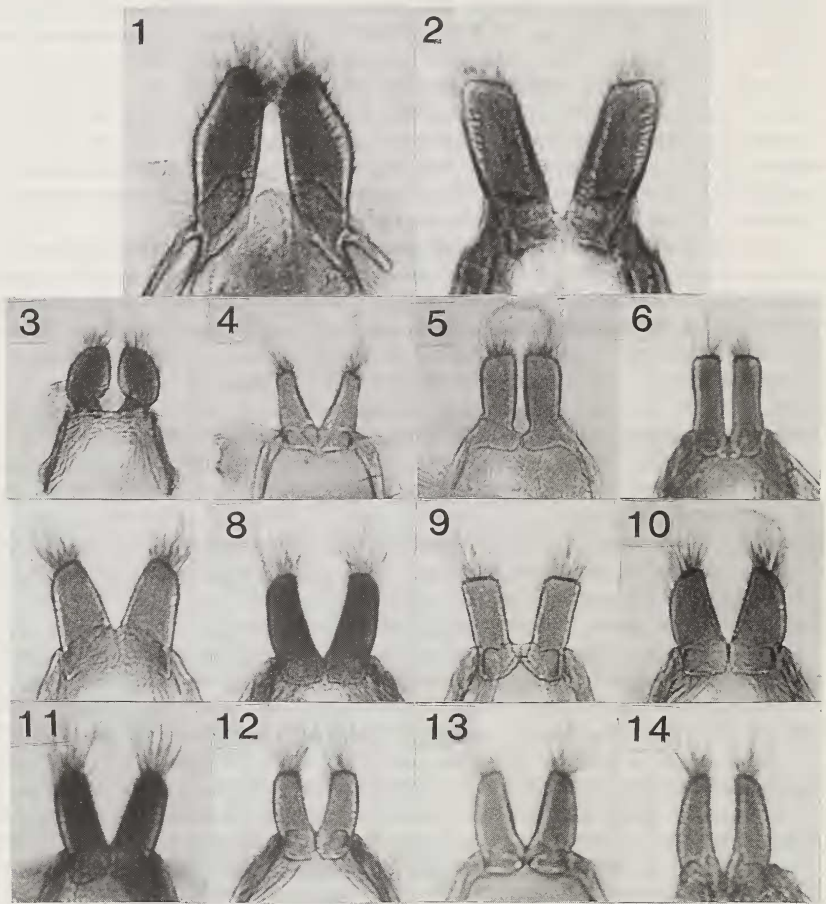
The following examples illustrate the use of gonocoxae and the shape of the last visible abdominal sternum to separate females of species that otherwise are very similar. The stout and rounded gonocoxae of females of *G. frosti* (Fig. 7) can be used to separate them from females of *G. sayi*, which have narrower gonocoxae that are concave on the inner margin (Fig. 8); also, the last abdominal sternum of females of *G. frosti* (Fig. 16) is broadly concave apically and distinctly sinuate laterally, while in females of *G. sayi* (Fig. 17) it is narrowly truncate apically and not sinuate laterally. The truncate gonocoxae of females of *Gyrinus ventralis* Kirby (Fig. 9) differ greatly from those of females of the structurally similar *Gyrinus gehringi* Chamberlain (Fig. 10) and females of other Wisconsin species with pale

venters. Females of *Gyrinus lecontei* Fall, which are also similar in many respects to those of *G. gehringi*, can be separated from that species by their narrower, infusate gonocoxae (Fig. 11), which are not convex laterally as they are in females of *G. gehringi*. The gonocoxae of females of *G. lecontei* can be used to tell them apart from the almost identical females of *Gyrinus aquiris* LeConte, which have gonocoxae (Fig. 12) that are shorter, concave on the inner margin, and never infusate. Furthermore, the sternal apex in females of *G. lecontei* is rounded (Fig. 18), while it is narrowly truncate in females of *G. aquiris* (Fig. 19). Females of *Gyrinus bifarius* Fall and *Gyrinus confinis* LeConte also have been difficult to separate, but the narrow and distinctly concave sternal apex of females of *G. bifarius* (Fig. 20), differs markedly from the rounded to truncate sternal apex of females of *G. confinis* (Fig. 21), and the gonocoxae are much shorter and broader in females of *G. bifarius* (Fig. 13) than in those of *G. confinis* (Fig. 14).

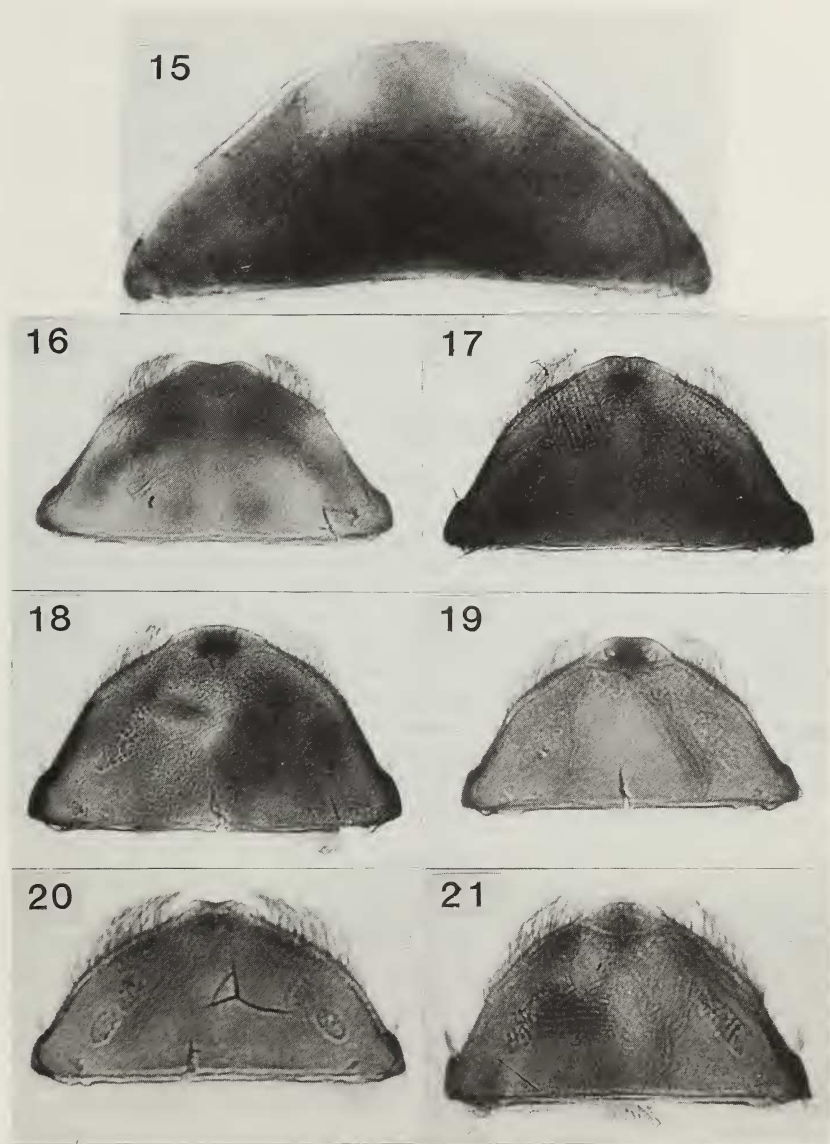
Revisions of families or genera of insects frequently rely on differences in male genitalia, and this often has been the situation in Hydradephaga. The large, sclerotized gonocoxae in females of *Gyrinus* differ substantially among closely related species and should be used to identify specimens in future studies of North American Gyrinidae. I also have noticed distinct differences in the gonocoxae of females of species of Dytiscidae that otherwise are structurally very similar. In future revisions of Hydradephaga, more attention should be paid to differences in the female genitalia to enable positive identification of females as well as males.

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Figs. 1-14. Gonocoxae of adult females: 1, *Dineutus nigrilor* Roberts; 2, *Gyrinus impressicollis* Kirby; 3, *G. sp. nr. minutus* Fabricius; 4, *G. aeneolus* LeConte; 5, *G. marginellus* Fall; 6, *G. analis* Say; 7, *G. frosti* Fall; 8, *G. sayi* Aubé; 9, *G. ventralis* Kirby; 10, *G. gehringi* Chamberlain; 11, *G. lecontei* Fall; 12, *G. aquiris* LeConte; 13, *G. bifarius* Fall; 14, *G. confinis* LeConte.



Figs. 15-21. Last abdominal sternum of adult females: 15, *Dineutus nigrator* Roberts; 16, *Gyrinus frosti* Fall; 17, *G. sayi* Aubé, 18, *G. lecontei* Fall; 19, *G. aquiris* LeConte; 20, *G. bifarius* Fall; 21, *G. confinis* LeConte.